EXHIBIT A

Singular Computing LLC v. Google LLC

C.A. No. 1:19-cv-12551-FDS

Joint Trial Exhibit List

Trial Exhibit No.	Bates Beg	Bates End	Description
1			Certified copy of U.S. Patent No. 9,218,156
2			Certified copy of U.S. Patent No. 8,407,273
3			Certified copy File History of U.S. Patent 8,407,273
4			Certified copy File History of U.S. Patent 9,218,156
5	SINGULAR-00004970	SINGULAR-00004984	July 2010 Computing 10,000x More Efficiently, Joe Bates
6	GOOG-SING-00240398	GOOG-SING-00240422	February 1, 2021 Google's ML Hardware Strategy: Build vs Buy
7	GOOG-SING-00027477	GOOG-SING-00027478	May 5, 2020 Document "What if Google Deployed V100s Instead of DragonFish? 2020-Q2" N. Patil and D. Patterson, updated May 20, 2020
8	GOOG-SING-00010227	GOOG-SING-00010341	July 23, 2020 Google Document "Jellyfish and Dragonfish Chip Specifications"
9	GOOG-SING-00012344	GOOG-SING-00012353	September 2018 Communications of the ACM Article "A Domain-Specific Supercomputer for Training Deep Neural Networks" by Norm Jouppi, et al
10	GOOG-SING-00013382	GOOG-SING-00013393	October 2018 Document "TPU Times"
11	SINGULAR-00018311	SINGULAR-00018321	November 2020 Singular Presentation slides "Computing 10,000x More Efficiently" by Joe Bates
12	GOOG-SING-00022834	GOOG-SING-00023752	Book "Computer Organization and Design" by Patterson and Hennessy (Revised Fourth Edition, 2012)
13	GOOG-SING-00026403	GOOG-SING-00026489	September 25, 2020 Google: Accelerator investment decision
14	GOOG-SING-00026624	GOOG-SING-00026684	February 1, 2017 Statement of Work No. 4 between Google Inc. and Avago Technologies International Sales Pte. Ltd re Project Quokka ASIC Final Product
15	GOOG-SING-00026687	GOOG-SING-00026758	September 10, 2020 Presentation slides "Cloud TPU Business Overview"
16	GOOG-SING-00026849	GOOG-SING-00026911	Presentation slides "MLPerf 0.6 Performance optimization and analysis"

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17	GOOG-SING-00022145	GOOG-SING-00022833	Computer Organization and Design, the Hardware/Software by Patterson and Hennessy 2005
18	GOOG-SING-00027590	GOOG-SING-00027661	Presentation slides "Google's Training Chips Revealed: TPUv2 and TPUv3" by T. Norrie, N. Patil
19	GOOG-SING-00028341	GOOG-SING-00028342	June 29, 2011 Email chain from J. Bates to A. Teller re complaints
20	GOOG-SING-00028357	GOOG-SING-00028358	February 9, 2012 Email from Teller to Bates re some personal feedback
21	GOOG-SING-00028362	GOOG-SING-00028362	July 19, 2013 Email from Teller to Bates re Deep Learning
22	GOOG-SING-00028408	GOOG-SING-00028431	February 15, 2015 Document "Jellyfish Straw-man"
23	GOOG-SING-00029804	GOOG-SING-00029805	September 23, 2013 Email between Bates and Dean re Good to meet you
24	GOOG-SING-00032375	GOOG-SING-00032375	January 24, 2014 Email from Bates to Boden re recent slides, showing Attachment:" Singular Computing for Nan Boden 24Jan2014.pdf"
25	GOOG-SING-00032376	GOOG-SING-00032393	January 2014 Singular Presentation slides "Many Million Core Processors" (Bates)
26	GOOG-SING-00032398	GOOG-SING-00032399	January 31, 2014 Email from Bates to Boden re recent slides
27	GOOG-SING-00038601	GOOG-SING-00038604	Email from T. Spalink to J. Bates re: options on Feb 2 and Feb 6?
28	GOOG-SING-00038634	GOOG-SING-00038640	Email from J. Wall to J. Bates cc: O. Felten, A. Patil, J. Laudon, C. Tornabene re: March 8-10 Attachments: SingularComputingMANDA20170301.pdf
29	GOOG-SING-00041189	GOOG-SING-00041196	2019 Executive Summary: Project DeepSea Customer Owned Tooling
30	GOOG-SING-00044494	GOOG-SING-00044518	Google: Seahorse, aka TBD Initial thoughts

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31	GOOG-SING-00048553	GOOG-SING-00048584	March 6, 2018 Document "MXU uArch Spec"
32	GOOG-SING-00075293	GOOG-SING-00075311	Presentation slides "ML System Roadmap and Impact" by N. Jouppi, et al
33	GOOG-SING-00078853	GOOG-SING-00078929	Google Platform for Machine Learning 2018 Session 2: TPU Architecture
34	GOOG-SING-00081909	GOOG-SING-00081916	March 2, 2019 Jellyfish for Perf
35	GOOG-SING-00083650	GOOG-SING-00083653	June 23, 2011 Email from Chen to Le Grand re Help with SIMD experts
36	GOOG-SING-00091189	GOOG-SING-00091229	Summer 2017 Presentation slides "Datacenter Hardware ML Update" by N. Jouppi, et al
37	GOOG-SING-00101399	GOOG-SING-00101462	June 2022 TPU v2 and TPUv3 versus Volta
38	GOOG-SING-00123330	GOOG-SING-00123412	Computer Architecture, A Quantitative Approach
39	GOOG-SING-00135443	GOOG-SING-00135501	June 26, 2018 Google TPU Pricing Review
40	GOOG-SING-00137054	GOOG-SING-00137216	Presentation titled Google Building a Planet-Scale Computer
41	GOOG-SING-00142221	GOOG-SING-00142221	Excel Spreadsheet "2017Q3: Accelerator Production Prices" (DC Cost, Capacity and Efficiency Metrics)
42	GOOG-SING-00144591	GOOG-SING-00144742	Google Platform for Machine Learning 2019
43	GOOG-SING-00144743	GOOG-SING-00144800	Presentation slides "A Supercomputer for Machine Learning" Basted on "In-Datacenter Performance Analysis of an Architecture Family of Scalable Multiprocessors for Neural Network Training"
44	GOOG-SING-00148944	GOOG-SING-00148966	October 2017 Platforms for Machine Learning
45	GOOG-SING-00149165	GOOG-SING-00149170	Nishant's Appeal
46	GOOG-SING-00152132	GOOG-SING-00152133	Email from Dean to Boden re: Fwd: Good to meet you
47	GOOG-SING-00192562	GOOG-SING-00192568	A Domain-Specific Supercomputer for Training Deep Neural

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48	GOOG-SING-00197321	GOOG-SING-00197357	November 13, 2018 Presentation titled Google ML-TPU Headcount Discussion
49	GOOG-SING-00204722	GOOG-SING-00204754	Google RMI 2019 TI OpEx budget ask June 2018
50	GOOG-SING-00207000	GOOG-SING-00207035	July 2020 Document titled Extending State-of-the-Art ML System Infrastructure at Google: Strategic Assessment
51	GOOG-SING-00222390	GOOG-SING-00222425	May 2018 Presentation titled Cloud TPUs: Demand and Deployment Update
52	GOOG-SING-00235971	GOOG-SING-00235980	July 2020 Jouppi et al., A Domain-Specific Supercomputer for Training Deep Neural Networks
53	GOOG-SING-00235981	GOOG-SING-00235992	February 15, 2018 Mixed Precision Training, ICLR conference paper
54	GOOG-SING-00236144	GOOG-SING-00236154	MXU uArch Diagrams
55	GOOG-SING-00236263	GOOG-SING-00236263	VPU Sublane (8x)
56	GOOG-SING-00236687	GOOG-SING-00236690	fp16 model quality email to Nvidia
57	GOOG-SING-00236774	GOOG-SING-00236790	Article "In-Datacenter Performance Analysis of a Tensor Processing Unit" by N. Jouppi, C. Young, et al, to appear at 44th International Symposium on Computer Architecture (ISCA), Toronto, Canada, June 26, 2017
58	GOOG-SING-00237405	GOOG-SING-00237457	GPU Technology Conference: INSIDE VOLTA by Nvidia
59	GOOG-SING-00239048	GOOG-SING-00239069	October 2017 Platforms for Machine Learning
60	GOOG-SING-00000387.R	GOOG-SING-0000415.002R	Document "Platforms for Machine Learning -v2, Current Perf/TCO & Competitive Analysis to Inform Strategic Vision", by Nishant Patil, Norm Jouppi, Yoon, et. al., last updated March, 2019
61	GOOG-SING-00240545	GOOG-SING-00240547	March 2, 2017 Notes titled Discussion with Joe Bates
62	GOOG-SING-00240892	GOOG-SING-00240928	GPU End of Life (EoL) Concerns
63	GOOG-SING-00241220	GOOG-SING-00241269	TPU and GPU Comparison for ML Training

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64	GOOG-SING-00241320	GOOG-SING-00241363	Google TPU Users Survey 2020-23
65	GOOG-SING-00241418	GOOG-SING-00241419	Spreadsheet: 2017-2018 Training chips, Training OpEx ($M)
66	GOOG-SING-00241421	GOOG-SING-00241424	June 27, 2011 Email from Teller to Rodman re Help with SIMD experts
67	GOOG-SING-00241494	GOOG-SING-00241495	July 9, 2021 Spreadsheet "TPU CAPEX"
68	GOOG-SING-00241496	GOOG-SING-00241496	July 9, 2021 Spreadsheet "TPU OPEX"
69	GOOG-SING-00241497	GOOG-SING-00241500	July 9, 2021 Spreadsheet: "TPU v1-v3 R_D Cost Analysis" 2016-2021 Dragonfish Payroll and Non-Payroll (Seastar, Jellyfish, Dragonfish) 2016-2021
70	GOOG-SING-00241501	GOOG-SING-00241504	July 9, 2021 Spreadsheet "US TPU Revenues" (native version used as Shafiei 30(b)(6) Depo exhibit 5)(2017-2021 Q1)
71	GOOG-SING-00241523	GOOG-SING-00241523	July 19, 2021 Spreadsheet "TPU share of DC Capex" (Yawn Power)
72	GOOG-SING-00242244	GOOG-SING-00242258	June 25-29, 2018 Holzrichter, Michael and Spaulding, Randy, “Convolutional Back Projection on the S1 Reduced Precision Processor,” Sandia National Laboratories
73	GOOG-SING-SC-000001	GOOG-SING-SC-000454	Google's Source Code Printout
74	LEESER000120	LEESER000121	The Wayback Machine, WildStar 5 PCI with Xilinx Virtext 5 FPGAs WILDSTAR 5 for PCI Hardware Features
75	OZGEN-00000028	OZGEN-00000029	May 3, 2018 Email from Wilcox to Ozgen re follow-up on Singular
76	GOOG-SING-00004194	GOOG-SING-00004207	ISCA 2019 Final Submission "In-Datacenter Performance Analysis of an Architecture Family of Scalable Multiprocessors for Neural Network Training"

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77	SINGULAR-00006472	SINGULAR-00006489	August 2017 Approximate Computing Embedded AI, Billion Core Systems (Bates)
78	SINGULAR-00015220	SINGULAR-00015221	March 2, 2017 Email from Bates to Felten re Jim Laudon, March 10
79	SINGULAR-00018236	SINGULAR-00018237	January 23, 2014 Email from Boden to joe@singularcomputing.com re Good to meet you
80	SINGULAR-00018250	SINGULAR-00018251	January 31, 2014 Email from Bates to Boden re recent slides
81	SINGULAR-00018392	SINGULAR-00018395	February 25, 2011 Email from Bates to Dean re hardware for mind
82	SINGULAR-00018435	SINGULAR-00018435	Email string from Felten to Bates, Patel, Laudon re: March 8-10
83			Article "From the garage to the Googleplex" Google, accessed at: https://about.google/our-story/
84			Physical Sample TPUv2 Board
85			Physical Sample TPUv3 Board
86			Physical Samples: S1 chip and S1 computer
87	GOOG-SING-00083889	GOOG-SING-00083889	Excel Spreadsheet "Positron Market Size Model"
88	GOOG-SING-00206442	GOOG-SING-00206472	Article "Deschutes 1.0 System Architecture As Applied to the Dragonfish Machine Learning System" (2017)